



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

BALTIMORE GAS AND ELECTRIC COMPANY

DOCKET NO. 50-317

CALVERT CLIFFS NUCLEAR POWER PLANT UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 100  
License No. DPR-53

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Baltimore Gas & Electric Company (the licensee) dated October 11, 1984, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

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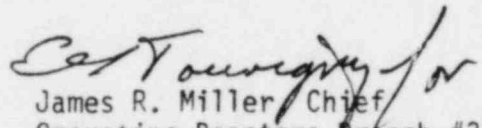
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-53 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No.100, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

  
James R. Miller, Chief  
Operating Reactors Branch #3  
Division of Licensing

Attachment:  
Changes to the Technical  
Specifications

Date of Issuance: February 22, 1985

ATTACHMENT TO LICENSE AMENDMENT NO.100

FACILITY OPERATING LICENSE NO. DPR-53

DOCKET NO. 50-317

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages. The revised pages are identified by Amendment number and contain vertical lines indicating the areas of change. The corresponding overleaf pages are provided to maintain document completeness.

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## 1.0 DEFINITIONS

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### DEFINED TERMS

1.1 The DEFINED TERMS of this section appear in capitalized type and are applicable throughout these Technical Specifications.

### THERMAL POWER

1.2 THERMAL POWER shall be the total reactor core heat transfer rate to the reactor coolant.

### RATED THERMAL POWER

1.3 RATED THERMAL POWER shall be a total reactor core heat transfer rate to the reactor coolant of 2700 Mwt.

### OPERATIONAL MODE

1.4 An OPERATIONAL MODE shall correspond to any one inclusive combination of core reactivity condition, power level and average reactor coolant temperature specified in Table 1.1.

### ACTION

1.5 ACTION shall be that part of a Specification which prescribes remedial measures required under designated conditions.

### OPERABLE - OPERABILITY

1.6 A system, subsystem, train, component or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified function(s). Implicit in this definition shall be the assumption that all necessary attendant instrumentation, controls, normal and emergency electrical power sources, cooling or seal water, lubrication or other required auxiliary equipment that are required for the system, subsystem, train, component or device to perform its function(s) are also capable of performing their related support function(s).

## DEFINITIONS

### REPORTABLE EVENT

1.7 A REPORTABLE EVENT shall be any of those conditions specified in Section 50.73 to 10 CFR Part 50.

### CONTAINMENT INTEGRITY

1.8 CONTAINMENT INTEGRITY shall exist when:

- 1.8.1 All penetrations required to be closed during accident conditions are either:
  - a. Capable of being closed by an OPERABLE containment automatic isolation valve system, or
  - b. Closed by manual valves, blind flanges, or deactivated automatic valves secured in their closed positions, except as provided in Table 3.6-1 of Specification 3.6.4.1.
- 1.8.2 All equipment hatches are closed and sealed,
- 1.8.3 Each airlock is OPERABLE pursuant to Specification 3.6.1.3,
- 1.8.4 The containment leakage rates are within the limits of Specification 3.6.1.2, and
- 1.8.5 The sealing mechanism associated with each penetration (e.g., welds, bellows or O-rings) is OPERABLE.

### CHANNEL CALIBRATION

1.9 A CHANNEL CALIBRATION shall be the adjustment, as necessary, of the channel output such that it responds with the necessary range and accuracy to known values of the parameter which the channel monitors. The CHANNEL CALIBRATION shall encompass the entire channel including the sensor and alarm and/or trip functions, and shall include the CHANNEL FUNCTIONAL TEST. The CHANNEL CALIBRATION may be performed by any series of sequential, overlapping or total channel steps such that the entire channel is calibrated.

## DEFINITIONS

### $\bar{E}$ - AVERAGE DISINTEGRATION ENERGY

1.20  $\bar{E}$  shall be the average (weighted in proportion to the concentration of each radionuclide in the reactor coolant at the time of sampling) of the sum of the average beta and gamma energies per disintegration (in MEV) for isotopes, other than iodines, with half lives greater than 15 minutes, making up at least 95% of the total non-iodine activity in the coolant.

### STAGGERED TEST BASIS

1.21 A STAGGERED TEST BASIS shall consist of:

- a. A test schedule for n systems, subsystems, trains or other designated components obtained by dividing the specified test interval into n equal subintervals, and
- b. The testing of one system, subsystem, train or other designated component at the beginning of each subinterval.

### FREQUENCY NOTATION

1.22 The FREQUENCY NOTATION specified for the performance of Surveillance Requirements shall correspond to the intervals defined in Table 1.2.

### AXIAL SHAPE INDEX

1.23 The AXIAL SHAPE INDEX ( $Y_E$ ) is the power level detected by the lower excore nuclear instrument detectors (L) less the power level detected by the upper excore nuclear instrument detectors (U) divided by the sum of these power levels. The AXIAL SHAPE INDEX ( $Y_I$ ) used for the trip and pretrip signals in the reactor protection system is the above value ( $Y_E$ ) modified by an appropriate multiplier (A) and a constant (B) to determine the true core axial power distribution for that channel.

$$Y_E = \frac{L-U}{L+U}$$

$$Y_I = AY_E + B$$

### UNRODDED PLANAR RADIAL PEAKING FACTOR - $F_{xy}$

1.24 The UNRODDED PLANAR RADIAL PEAKING FACTOR is the maximum ratio of the peak to average power density of the individual fuel rods in any of the unrodded horizontal planes, excluding tilt.

## DEFINITIONS

### REACTOR TRIP SYSTEM RESPONSE TIME

1.25 The REACTOR TRIP SYSTEM RESPONSE TIME shall be the time interval from when the monitored parameter exceeds its trip setpoint at the channel sensor until electrical power is interrupted to the CEA drive mechanism.

### ENGINEERED SAFETY FEATURE RESPONSE TIME

1.26 The ENGINEERED SAFETY FEATURE RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its ESF actuation setpoint at the channel sensor until the ESF equipment is capable of performing its safety function (i.e., the valves travel to their required positions, pump discharge pressures reach their required values, etc.). Times shall include diesel generator starting and sequence loading delays where applicable.

### PHYSICS TESTS

1.27 PHYSICS TEST shall be those tests performed to measure the fundamental nuclear characteristics of the reactor core and related instrumentation and 1) described in Chapter 13.0 of the FSAR, 2) authorized under the provisions of 10 CFR 50.59, or 3) otherwise approved by the Commission.

### UNRODDED INTEGRATED RADIAL PEAKING FACTOR - $F_r$

1.28 The UNRODDED INTEGRATED RADIAL PEAKING FACTOR is the ratio of the peak pin power to the average pin power in an unrodded core, excluding tilt.

### GASEOUS RADWASTE TREATMENT SYSTEM

1.29 A GASEOUS RADWASTE TREATMENT SYSTEM is any system designed and installed to reduce radioactive gaseous effluents by collecting primary coolant system offgases from the primary system and providing for delay or holdup for the purpose of reducing the total radioactivity prior to release to the environment.

### MEMBER(S) OF THE PUBLIC

1.30 MEMBER(S) OF THE PUBLIC shall include all persons who are not occupationally associated with the plant. This category does not include employees of the utility, its contractors or vendors. Also excluded from this category are persons who enter the site to service equipment or to make deliveries.

### OFFSITE DOSE CALCULATION MANUAL (ODCM)

1.31 The OFFSITE DOSE CALCULATION MANUAL shall contain the current methodology and parameters used in the calculation of offsite doses due to radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring alarm/trip setpoints, and in the conduct of the environmental radiological monitoring program.

## DEFINITIONS

### PROCESS CONTROL PROGRAM (PCP)

1.32 The PROCESS CONTROL PROGRAM shall contain the current formula, sampling, analyses, tests, and determinations to be made to ensure that the processing and packaging of solid radioactive wastes based on demonstrated processing of actual or simulated wet solid wastes will be accomplished in such a way as to assure compliance with 10 CFR Part 20, 10 CFR Part 71 and Federal and State and local regulations governing the disposal of the radioactive waste.

### PURGE - PURGING

1.33 PURGE or PURGING is the controlled process of discharging air or gas from a confinement to maintain temperature, humidity, concentration or other operating condition, in such a manner that replacement air or gas is required to purify the confinement.

### SITE BOUNDARY

1.34 The SITE BOUNDARY shall be that line beyond which the land is neither owned, nor leased, nor otherwise controlled by the licensee.

### SOLIDIFICATION

1.35 SOLIDIFICATION shall be the conversion of wet wastes into a form that meets shipping and burial ground requirements.

### SOURCE CHECK

1.36 A SOURCE CHECK shall be the qualitative assessment of channel response when the channel sensor is exposed to a source of increased radioactivity.

### UNRESTRICTED AREA

1.37 An UNRESTRICTED AREA shall be any area at or beyond the SITE BOUNDARY access to which is not controlled by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials, or any area within the SITE BOUNDARY used for residential quarters or for industrial, commercial, institutional, and/or recreational purposes.

### VENTILATION EXHAUST TREATMENT SYSTEM

1.38 A VENTILATION EXHAUST TREATMENT SYSTEM is any system designed and installed to reduce gaseous radioiodine or radioactive material in particulate form in effluents by passing ventilation or vent exhaust gases through charcoal adsorbers and/or HEPA filters for the purpose of removing iodines or particulates from the gaseous exhaust stream prior to the release to the environment. Such a system is not considered to have any effect on noble gas effluents. Engineered Safety Feature (ESF) atmospheric cleanup systems are not considered to be VENTILATION EXHAUST TREATMENT SYSTEM components.

## DEFINITIONS

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### VENTING

1.39 VENTING is the controlled process of discharging air or gas from a confinement to maintain temperature, pressure, humidity, concentration or other operating condition, in such a manner that replacement air or gas is not provided or required during VENTING. Vent, used in system names, does not imply a VENTING process.

TABLE 1.1  
OPERATIONAL MODES

<u>MODE</u>	<u>REACTIVITY CONDITION, <math>K_{eff}</math></u>	<u>%RATED THERMAL POWER*</u>	<u>AVERAGE COOLANT TEMPERATURE</u>
1. POWER OPERATION	$\geq 0.99$	$> 5\%$	$\geq 300^{\circ}\text{F}$
2. STARTUP	$\geq 0.99$	$\leq 5\%$	$\geq 300^{\circ}\text{F}$
3. HOT STANDBY	$< 0.99$	0	$\geq 300^{\circ}\text{F}$
4. HOT SHUTDOWN	$< 0.99$	0	$300^{\circ}\text{F} > T_{avg}$ $> 200^{\circ}\text{F}$
5. COLD SHUTDOWN	$< 0.99$	0	$\leq 200^{\circ}\text{F}$
6. REFUELING**	$\leq 0.95$	0	$\leq 140^{\circ}\text{F}$

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\* Excluding decay heat.

\*\* Reactor vessel head unbolted or removed and fuel in the vessel.

TABLE 1.2  
FREQUENCY NOTATION

<u>NOTATION</u>	<u>FREQUENCY</u>
S	At least once per 12 hours.
D	At least once per 24 hours.
W	At least once per 7 days.
M	At least once per 31 days.
Q	At least once per 92 days.
SA	At least once per 6 months.
R	At least once per 18 months.
S/U	Prior to each reactor startup.
P	Completed prior to each release.
N.A.	Not applicable.



### 3/4.12 RADIOLOGICAL ENVIRONMENTAL MONITORING

#### MONITORING PROGRAM

#### LIMITING CONDITION FOR OPERATION

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3.12.1 The radiological environmental monitoring program shall be conducted as specified in Table 3.12-1.

APPLICABILITY: At all times.

ACTION:

- a. With the radiological environmental monitoring program not being conducted as specified in Table 3.12-1, prepare and submit to the Commission in the Annual Radiological Environmental Operating Report a description of the reasons for not conducting the program as required and the plans for preventing a recurrence.
- b. With the level of radioactivity as the result of plant effluents in an environmental sample at a specified location exceeding the reporting levels of Table 3.12-2, prepare and submit to the Commission within 30 days after receiving the sample analysis, pursuant to Specification 6.9.2, a Special Report that identifies the cause(s) for exceeding the limit(s) and defines the corrective actions to be taken to reduce radioactive effluents. When more than one of the radionuclides in Table 3.12-2 are detected in the sample, this report shall be submitted if:

$$\frac{\text{concentration}(1)}{\text{reporting level}(1)} + \frac{\text{concentration}(2)}{\text{reporting level}(2)} + \dots \geq 1.0$$

This report is not required if the measured level of radioactivity was not the result of plant effluents; however, in such an event, the condition shall be reported and described in the Annual Radiological Environmental Operating Report.

- c. With fresh leafy vegetable samples unavailable from one or more of the sample locations required by Table 3.12-1, identify locations for obtaining replacement samples and add them to the radiological environmental monitoring program within 30 days. The specific locations from which samples were unavailable may then be deleted from the monitoring program. Identify the cause of the unavailability of samples and identify the new location(s) for obtaining the replacement samples in the next Annual Radiological Environmental Operating Report.

3/4.12 RADIOLOGICAL ENVIRONMENTAL MONITORING

MONITORING PROGRAM

LIMITING CONDITION FOR OPERATION

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- d. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

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4.12.1 The radiological environmental monitoring samples shall be collected pursuant to Table 3.12-1 from the specific locations given in the table and figure(s) in the ODCM, and shall be analyzed pursuant to the requirements of Table 3.12-1 and the detection capabilities required by Table 4.12-1.

TABLE 3.12-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

<u>Exposure Pathway and/or Sample</u>	<u>Number of Representative Samples and Sample Locations<sup>a</sup></u>	<u>Sampling and Collection Frequency</u>	<u>Type and Frequency of Analysis</u>
1. DIRECT RADIATION <sup>b</sup>	<p>23 routine monitoring stations (DR1-DR23) either with two or more dosimeters or with one instrument for measuring and recording dose rate continuously, placed as follows:</p> <p>an inner ring of stations, one in each meteorological sector in the general area of the SITE BOUNDARY (DR1-DR9);</p> <p>an outer ring of stations, one in each meteorological sector in the 6- to 8-km range from the site (DR10-DR18);</p> <p>the remaining stations (DR19-DR23) to be placed in special interest areas such as population centers, nearby residences, schools, and in 1 area to serve as a control station.</p>	At least Quarterly	Gamma dose at least quarterly.
2. AIRBORNE	<p>Samples from 5 locations (A1-A5):</p> <p>3 samples (A1-A3) from close to the 3 SITE BOUNDARY locations, in different sectors of the highest</p>	Continuous sampler operation with sample collection weekly, or more frequently if required by dust loading.	<p><u>Radioiodine Cannister</u> I-131 analysis weekly.</p> <p><u>Particulate Sampler:</u> Gross beta radioactivity analysis following</p>
Radioiodine and Particulates			

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TABLE 3.12-1 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

<u>Exposure Pathway and/or Sample</u>	<u>Number of Representative Samples and Sample Locations<sup>a</sup></u>	<u>Sampling and Collection Frequency</u>	<u>Type and Frequency of Analysis</u>
	calculated annual average ground-level D/Q.		filter change; <sup>c</sup> Gamma isotopic analysis <sup>d</sup> of composite (by location) quarterly.
	1 sample (A4) from the vicinity of a community having the highest calculated annual average ground-level D/Q.		
	1 sample (A5) from a control location, as for example 15-30 km distant and in the least prevalent wind direction.		
3. WATERBORNE			
a. Surface	1 sample at intake area (Wa1) 1 sample at discharge area (Wa2)	Composite sample over 1-month period <sup>e</sup>	Gamma isotopic analysis <sup>d</sup> monthly. Composite for tritium analysis quarterly.
b. Sediment from shoreline	1 sample from downstream area with existing or potential recreational value (Wb1).	Semiannually	Gamma isotopic analysis <sup>d</sup> semiannually.
4. INGESTION			
a. Fish and Invertebrates	3 samples of commercially and/or recreationally important species (2 fish species and 1 invertebrate species) in vicinity of plant discharge area (Ia1-Ia3).  3 samples of same species in areas not influenced by plant discharge (Ia4-Ia6).	Sample in season, or semiannually if they are not seasonal.	Gamma isotopic analysis <sup>d</sup> on edible portions.

TABLE 3.12-1 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

<u>Exposure Pathway and/or Sample</u>	<u>Number of Representative Samples and Sample Locations<sup>a</sup></u>	<u>Sampling and Collection Frequency</u>	<u>Type and Frequency of Analysis</u>
b. Food Products	Samples of 3 different kinds of broad leaf vegetation grown near the site boundary at 2 different locations of highest predicted annual average groundlevel D/Q (Ib1-Ib6).	Monthly during growing season.	Gamma isotopic <sup>d</sup> and I-131 analysis.
	1 sample of each of the similar broad leaf vegetation grown 15-30 km distant in the least prevalent wind direction (Ib7-Ib9).	Monthly during growing season.	Gamma isotopic <sup>d</sup> and I-131 analysis.

TABLE 3.12-1 (Continued)

TABLE NOTATION

- a The code in parentheses, e.g., DR1, A1, defines generic sample locations in this specification that can be used to identify the specific locations in the map(s) and table in the ODCM. Specific parameters of distance and direction sector from the central point between the two containment buildings and additional description where pertinent is provided for each sample location in Table 3.12-1, and in a table and figure(s) in the ODCM. Refer to NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants, October 1978", and to Radiological Assessment Branch Technical Position, Revision 1, November 1979. Deviations are permitted from the required sampling schedule if specimens are unobtainable due to circumstances such as hazardous conditions, seasonal unavailability, and malfunction of automatic sampling equipment. If specimens are unobtainable due to sampling equipment malfunction, effort shall be made to complete corrective action prior to the end of the next sampling period. All deviations from the sampling schedule shall be documented in the Annual Radiological Environmental Operating Report. It is recognized that, at times, it may not be possible or practicable to continue to obtain samples of the media of choice at the most desired location or time. In these instances, suitable alternative media and locations may be chosen for the particular pathway in question and appropriate substitutions made within 30 days in the radiological environmental monitoring program. Identify the cause of the unavailability of samples for that pathway and identify the new location(s) for obtaining samples in the next Annual Radiological Environmental Operating Report and also include in the report a revised figure(s) and table for the ODCM reflecting the new location(s).
- b One or more instruments, such as a pressurized ion chamber, for measuring and recording dose rate continuously may be used in place of, or in addition to, integrating dosimeters. For the purposes of this table, a thermoluminescent dosimeter (TLD) is considered to be one phosphor; two or more phosphors in a packet are considered as two or more dosimeters. Film badges shall not be used as dosimeters for measuring direct radiation. The frequency of analysis or readout for TLD systems will depend upon the characteristics of the specific system used and should be selected to obtain optimum dose information with minimal fading. Due to the geographical limitations, 9 sectors are monitored around the Calvert Cliffs Nuclear Power Plant.
- c Airborne particulate sample filters shall be analyzed for gross beta radioactivity 24 hours or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air particulate samples is greater than ten times the yearly mean of control samples, gamma isotopic analysis shall be performed on the individual samples.

TABLE 3.12-1 (Continued)

TABLE NOTATION (Continued)

- d Gamma isotopic analysis means the identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents from the facility.
- e A composite sample is one in which the quantity (aliquot) of liquid sampled is proportional to the quantity of flowing liquid and in which the method of sampling employed results in a specimen that is representative of the liquid flow. In this program, composite sample aliquots shall be collected at time intervals that are very short (e.g., hourly) relative to the compositing period (e.g., monthly) in order to assure obtaining a representative sample.

TABLE 3.12-2

## REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

## REPORTING LEVELS

Analysis	Water (pCi/l)	Airborne Particulate or Gases (pCi/m <sup>3</sup> )	Fish & Invertebrates (pCi/kg, wet)	Milk (pCi/l)	Food Products (pCi/kg, wet)
H-3	20,000*				
Mn-54	1,000		30,000		
Fe-59	400		10,000		
Co-58	1,000		30,000		
Co-60	300		10,000		
Zn-65	300		20,000		
Zr-Nb-95	400				
I-131	2	0.9		3	100
Cs-134	30	10	1,000	60	1,000
Cs-137	50	20	2,000	70	2,000
Ba-La-140	200			300	

\*For drinking water samples. This is a 40 CFR Part 141 value. If no drinking water pathway exists, a value of 30,000 pCi/l may be used.

CALVERT CLIFFS - UNIT 1

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TABLE 4.12-1

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS<sup>a,b</sup>LOWER LIMIT OF DETECTION (LLD)<sup>c</sup>

Analysis	Water (pCi/l)	Airborne Particulate or Gases (pCi/m <sup>3</sup> )	Fish & Invertebrates (pCi/kg, wet)	Milk (pCi/l)	Food Products (pCi/kg, wet)	Sediment (pCi/kg, dry)
Gross Beta	4	0.01				
H-3	2000*					
Mn-54	15		130			
Fe-59	30		260			
Co-58,60	15		130			
Zn-65	30		260			
Zr-Nb-95	15					
I-131	1 <sup>d</sup>	0.07		1	60	
Cs-134	15	0.05	130	15	60	150
Cs-137	18	0.06	150	18	80	180
Ba-La-140	15			15		

\*If no drinking water pathway exists, a value of 3000 pCi/l may be used.

TABLE 4.12-1 (Continued)

TABLE NOTATION

- a This list does not mean that only these nuclides are to be considered. Other peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Annual Radiological Environmental Operating Report.
- b Required detection capabilities for thermoluminescent dosimeters used for environmental measurements shall be in accordance with the recommendations of Regulatory Guide 4.13.
- c The LLD is defined, for purposes of these specifications, as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66s_b}{E \cdot V \cdot 2.22 \cdot Y \cdot \exp(-\lambda \Delta t)}$$

Where:

LLD is the "A priori" lower limit of detection as defined above, as picocuries per unit mass or volume,

$s_b$  is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate, as counts per minute,

E is the counting efficiency, as counts per disintegration,

V is the sample size in units of mass or volume,

2.22 is the number of disintegrations per minute per picocurie,

Y is the fractional radiochemical yield, when applicable,

$\lambda$  is the radioactive decay constant for the particular radionuclide, and

$\Delta t$  for environmental samples is the elapsed time between sample collection, or end of the sample collection period, and time of counting

Typical values of E, V, Y and  $\Delta t$  should be used in the calculation.

TABLE 4.12-1 (Continued)

TABLE NOTATION

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement. Analyses shall be performed in such a manner that the stated LLDs will be achieved under routine conditions. Occasionally background fluctuations, unavoidable small sample sizes, the presence of interfering nuclides, or other uncontrollable circumstances may render these LLDs unachievable. In such cases, the contributing factors shall be identified and described in the Annual Radiological Environmental Operating Report.

- <sup>d</sup> LLD for drinking water samples. If no drinking water pathway exists, the LLD of gamma isotopic analysis may be used.

### 3/4.12 RADIOLOGICAL ENVIRONMENTAL MONITORING

#### LAND USE CENSUS

#### LIMITING CONDITION FOR OPERATION

3.12.2 A land use census shall be conducted and shall identify within a distance of 8 km (5 miles) the location in each of the 9 meteorological sectors of the nearest milk animal, the nearest residence and the nearest garden\* of greater than 50 m<sup>2</sup> (500 ft<sup>2</sup>) producing broad leaf vegetation. (For elevated releases as defined in Regulatory Guide 1.111, Revision 1, July 1977, the land use census shall also identify within a distance of 5 km (3 miles) the locations in each of the 9 meteorological sectors of all milk animals and all gardens of greater than 50 m<sup>2</sup> producing broad leaf vegetation.)

APPLICABILITY: At all times.

#### ACTION:

- a. With a land use census identifying a location(s) that yields a calculated dose or dose commitment greater than the values currently being calculated, identify the new location(s) in the next Annual Radiological Environmental Operating Report.
- b. With a land use census identifying a location(s) that yields a calculated dose or dose commitment (via the same exposure pathway) 20 percent greater than at a location from which samples are currently being obtained in accordance with Specification 3.12.1, add the new location(s) to the radiological environmental monitoring program within 30 days. The sampling location(s), excluding the control station location, having the lowest calculated dose or dose commitment(s), via the same exposure pathway, may be deleted from this monitoring program after October 31 of the year in which this land use census was conducted. Identify the new location(s) in the next Annual Radiological Environmental Operating Report and also include in the report a revised figure(s) and table for the ODCM reflecting the new location(s).
- c. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

#### SURVEILLANCE REQUIREMENTS

4.12.2 The land census shall be conducted during the growing season at least once per 12 months using that information that will provide the best results, such as by a door-to-door survey, aerial survey, or by consulting local agricultural authorities. The results of the land use census shall be included in the Annual Radiological Environmental Operating Report.

\*Broad leaf vegetation sampling of at least three different kinds of vegetation may be performed at the site boundary in each of two different direction sectors with the highest predicted D/Qs in lieu of the garden census. Specifications for broad leaf vegetation sampling in Table 3.12.1.4b shall be followed, including analysis of control samples.

3/4.12 RADIOLOGICAL ENVIRONMENTAL MONITORING

INTERLABORATORY COMPARISON PROGRAM

LIMITING CONDITION FOR OPERATION

---

3.12.3 Analyses shall be performed on all radioactive materials, supplied as part of an Interlaboratory Comparison Program that has been approved by the Commission, that correspond to samples required by Table 3.12-1.

APPLICABILITY: At all times.

ACTION:

- a. With analyses not being performed as required above, report the corrective actions taken to prevent a recurrence to the Commission in the Annual Radiological Environmental Operating Report.
- b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

---

4.12.3 The Interlaboratory Comparison Program shall be described in the ODCM. A summary of the results obtained as part of the above required Interlaboratory Comparison Program shall be included in the Annual Radiological Environmental Operating Report.

### 3/4.12 RADIOLOGICAL ENVIRONMENTAL MONITORING

#### BASES

#### 3/4.12.1 MONITORING PROGRAM

The radiological environmental monitoring program required by this specification provides representative measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides that lead to the highest potential radiation exposures to MEMBERS OF THE PUBLIC resulting from the plant operation. This monitoring program implements Section IV.B.2 of Appendix I to 10 CFR Part 50 and thereby supplements the radiological effluent monitoring program by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and the modeling of the environmental exposure pathways. Guidance for this monitoring program is provided by the Radiological Assessment Branch Technical Position on Environmental Monitoring. Program changes may be initiated based on operational experience.

The required detection capabilities for environmental sample analyses are tabulated in terms of the lower limits of detection (LLDs). The LLDs required by Table 4.12-1 are considered optimum for routine environmental measurements in industrial laboratories. It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement.

Detailed discussion of the LLD and other detection limits can be found in HASL Procedures Manual, HASL-300 (revised annually), Currie, L. A., "Limits for Qualitative Detection and Quantitative Determination - Application to Radiochemistry," anal. Chem. 40, 586-93 (1968), and Hartwell, J. K., "Detection Limits for Radioanalytical Counting Techniques," Atlantic Richfield Hanford Company Report ARH-SA-215 (June 1975).

#### 3/4.12.2 LAND USE CENSUS

This specification is provided to ensure that changes in the use of areas at and beyond the SITE BOUNDARY are identified and that modifications to the radiological environmental monitoring program are made if required by the results of this census. The best information from the door-to-door survey, from aerial survey or from consulting with local agricultural authorities shall be used. This census satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50. Restricting the census to gardens of greater than 50 m<sup>2</sup> provides assurance that significant exposure pathways via leafy vegetables will be identified and monitored since a garden of this size is the minimum required to produce the quantity (26 kg/year) of leafy vegetables assumed in Regulatory Guide 1.109 for consumption by a child. To determine this minimum garden size, the following assumptions were made: 1) 20% of the garden was used for growing broad leaf vegetation (i.e., similar to lettuce and cabbage), and 2) a vegetation yield of 2 kg/m<sup>2</sup>.

3/4.12 RADIOLOGICAL ENVIRONMENTAL MONITORING

BASES

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3/4.12.3 INTERLABORATORY COMPARISON PROGRAM

The requirement for participation in an approved Interlaboratory Comparison Program is provided to ensure that independent checks on the precision and accuracy of the measurements of radioactive material in environmental sample matrices are performed as part of the quality assurance program for environmental monitoring in order to demonstrate that the results are valid for the purposes of Section IV.B.2 of Appendix I to 10 CFR Part 50.

## 5.0 DESIGN FEATURES

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### 5.1 SITE

#### MAP DEFINING THE SITE BOUNDARY AND EFFLUENT RELEASE POINTS

5.1.1 A map of the Calvert Cliffs Nuclear Power Plant site identifying the major plant structures as well as defining the radioactive effluent release points and the SITE BOUNDARY is shown in Figure 5.1-1.

#### LOW POPULATION ZONE

5.1.2 The low population zone shall be as shown in Figure 5.1-2.

### 5.2 CONTAINMENT

#### CONFIGURATION

5.2.1 The reactor containment building is a steel lined, reinforced concrete building of cylindrical shape, with a dome roof and having the following design features:

- a. Nominal inside diameter = 130 feet.
- b. Nominal inside height =  $181 \frac{2}{3}$  feet.
- c. Minimum thickness of concrete walls =  $3 \frac{3}{4}$  feet.
- d. Minimum thickness of concrete roof =  $3 \frac{1}{4}$  feet.
- e. Minimum thickness of concrete floor pad = 10 feet.
- f. Nominal thickness of steel liner =  $\frac{1}{4}$  inches.
- g. Net free volume =  $2 \times 10^6$  cubic feet.



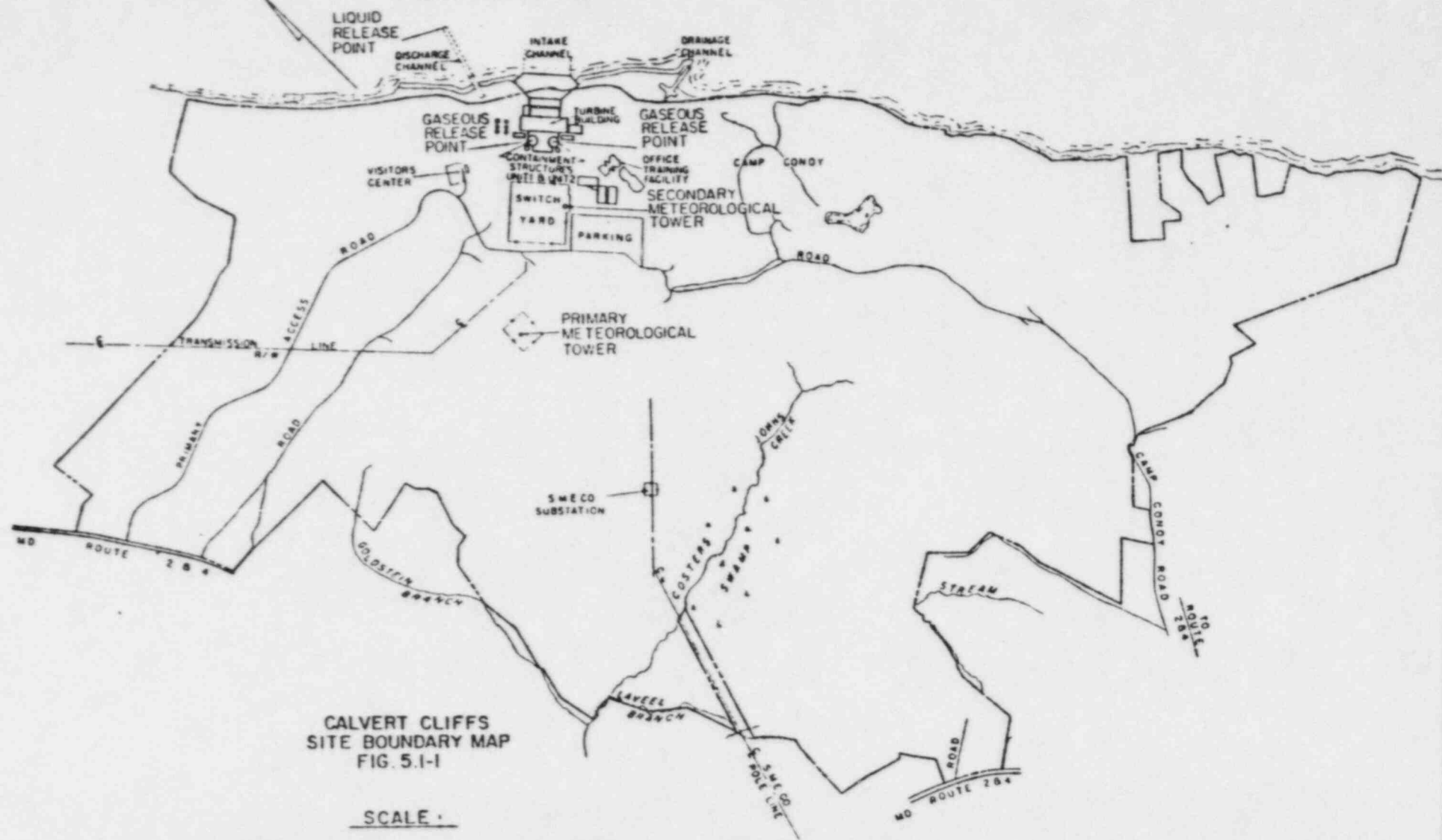
CHESAPEAKE BAY

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CALVERT CLIFFS - UNIT 1

5-2

Amendment No. 100



CALVERT CLIFFS SITE BOUNDARY MAP FIG. 5.1-1

SCALE :



CALVERT CLIFFS NUCLEAR POWER PLANT

UNIT NOS. 1 AND 2

APPENDIX B

PART I

ENVIRONMENTAL TECHNICAL SPECIFICATIONS

FACILITY OPERATING LICENSE NOS. DPR-53 AND DPR-69

NOTE

Section 3.0, Environmental Surveillance and Monitoring, has been deleted. Any other portion of the Appendix B Part I Environmental Technical Specifications dealing with Environmental Monitoring is hereby superseded by Appendix A Technical Specification Section 3/4.12.

When the Radiological Effluent Technical Specifications (RETS) are fully implemented, Appendix B, Part I, will be deleted in its entirety.

ISSUED BY THE U. S. NUCLEAR REGULATORY COMMISSION

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3.0 ENVIRONMENTAL SURVEILLANCE AND MONITORING

DELETED

3.2 RADIOLOGICAL ENVIRONMENTAL MONITORING

DELETED



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

BALTIMORE GAS AND ELECTRIC COMPANY

DOCKET NO. 50-318

CALVERT CLIFFS NUCLEAR POWER PLANT UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 82  
License No. DPR-69

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Baltimore Gas & Electric Company (the licensee) dated October 11, 1984, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

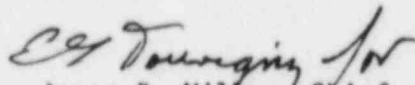
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.2 of Facility Operating License No. DPR-69 is hereby amended to read as follows:

2. Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 82, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



James R. Miller, Chief  
Operating Reactors Branch #3  
Division of Licensing

Attachment:  
Changes to the Technical  
Specifications

Date of Issuance: February 22, 1985

ATTACHMENT TO LICENSE AMENDMENT NO. 82

FACILITY OPERATING LICENSE NO. DPR-69

DOCKET NO. 50-318

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages. The revised pages are identified by Amendment number and contain vertical lines indicating the areas of change. The corresponding overleaf pages are provided to maintain document completeness.

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## 1.0 DEFINITIONS

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### DEFINED TERMS

1.1 The DEFINED TERMS of this section appear in capitalized type and are applicable throughout these Technical Specifications.

### THERMAL POWER

1.2 THERMAL POWER shall be the total reactor core heat transfer rate to the reactor coolant.

### RATED THERMAL POWER

1.3 RATED THERMAL POWER shall be a total reactor core heat transfer rate to the reactor coolant of 2700 MWt.

### OPERATIONAL MODE

1.4 An OPERATIONAL MODE shall correspond to any one inclusive combination of core reactivity condition, power level and average reactor coolant temperature specified in Table 1.1.

### ACTION

1.5 ACTION shall be that part of a Specification which prescribes remedial measures required under designated conditions.

### OPERABLE - OPERABILITY

1.6 A system, subsystem, train, component or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified function(s). Implicit in this definition shall be the assumption that all necessary attendant instrumentation, controls, normal and emergency electrical power sources, cooling or seal water, lubrication or other required auxiliary equipment that are required for the system, subsystem, train, component or device to perform its function(s) are also capable of performing their related support function(s).

## DEFINITIONS

### REPORTABLE EVENT

1.7 A REPORTABLE EVENT shall be any of those conditions specified in Section 50.73 to 10 CFR Part 50.

### CONTAINMENT INTEGRITY

1.8 CONTAINMENT INTEGRITY shall exist when:

- 1.8.1 All penetrations required to be closed during accident conditions are either:
  - a. Capable of being closed by an OPERABLE containment automatic isolation valve system, or
  - b. Closed by manual valves, blind flanges, or deactivated automatic valves secured in their closed positions, except as provided in Table 3.6-1 of Specification 3.6.4.1.
- 1.8.2 All equipment hatches are closed and sealed,
- 1.8.3 Each airlock is OPERABLE pursuant to Specification 3.6.1.3,
- 1.8.4 The containment leakage rates are within the limits of Specification 3.6.1.2, and
- 1.8.5 The sealing mechanism associated with each penetration (e.g., welds, bellows or O-rings) is OPERABLE.

### CHANNEL CALIBRATION

1.9 A CHANNEL CALIBRATION shall be the adjustment, as necessary, of the channel output such that it responds with the necessary range and accuracy to known values of the parameter which the channel monitors. The CHANNEL CALIBRATION shall encompass the entire channel including the sensor and alarm and/or trip functions, and shall include the CHANNEL FUNCTIONAL TEST. The CHANNEL CALIBRATION may be performed by any series of sequential, overlapping or total channel steps such that the entire channel is calibrated.

## DEFINITIONS

### Ē - AVERAGE DISINTEGRATION ENERGY

1.20  $\bar{E}$  shall be the average (weighted in proportion to the concentration of each radionuclide in the reactor coolant at the time of sampling) of the sum of the average beta and gamma energies per disintegration (in MEV) for isotopes, other than iodines, with half lives greater than 15 minutes, making up at least 95% of the total non-iodine activity in the coolant.

### STAGGERED TEST BASIS

1.21 A STAGGERED TEST BASIS shall consist of:

- a. A test schedule for n systems, subsystems, trains or other designated components obtained by dividing the specified test interval into n equal subintervals, and
- b. The testing of one system, subsystem, train or other designated component at the beginning of each subinterval.

### FREQUENCY NOTATION

1.22 The FREQUENCY NOTATION specified for the performance of Surveillance Requirements shall correspond to the intervals defined in Table 1.2.

### AXIAL SHAPE INDEX

1.23 The AXIAL SHAPE INDEX ( $Y_E$ ) is the power level detected by the lower excore nuclear instrument detectors (L) less the power level detected by the upper excore nuclear instrument detectors (U) divided by the sum of these power levels. The AXIAL SHAPE INDEX ( $Y_I$ ) used for the trip and pretrip signals in the reactor protection system is the above value ( $Y_E$ ) modified by an appropriate multiplier (A) and a constant (B) to determine the true core axial power distribution for that channel.

$$Y_E = \frac{L-U}{L+U}$$

$$Y_I = AY_E + B$$

### UNRODDED PLANAR RADIAL PEAKING FACTOR - $F_{xy}$

1.24 The UNRODDED PLANAR RADIAL PEAKING FACTOR is the maximum ratio of the peak to average power density of the individual fuel rods in any of the unrodded horizontal planes, excluding tilt.



## DEFINITIONS

### REACTOR TRIP SYSTEM RESPONSE TIME

1.25 The REACTOR TRIP SYSTEM RESPONSE TIME shall be the time interval from when the monitored parameter exceeds its trip setpoint at the channel sensor until electrical power is interrupted to the CEA drive mechanism.

### ENGINEERED SAFETY FEATURE RESPONSE TIME

1.26 The ENGINEERED SAFETY FEATURE RESPONSE TIME shall be that time interval from when the monitored parameter exceeds its ESF actuation setpoint at the channel sensor until the ESF equipment is capable of performing its safety function (i.e., the valves travel to their required positions, pump discharge pressures reach their required values, etc.). Times shall include diesel generator starting and sequence loading delays where applicable.

### PHYSICS TESTS

1.27 PHYSICS TEST shall be those tests performed to measure the fundamental nuclear characteristics of the reactor core and related instrumentation and 1) described in Chapter 13.0 of the FSAR, 2) authorized under the provisions of 10 CFR 50.59, or 3) otherwise approved by the Commission.

### UNRODDED INTEGRATED RADIAL PEAKING FACTOR - $F_r$

1.28 The UNRODDED INTEGRATED RADIAL PEAKING FACTOR is the ratio of the peak pin power to the average pin power in an unrodded core, excluding tilt.

### GASEOUS RADWASTE TREATMENT SYSTEM

1.29 A GASEOUS RADWASTE TREATMENT SYSTEM is any system designed and installed to reduce radioactive gaseous effluents by collecting primary coolant system offgases from the primary system and providing for delay or holdup for the purpose of reducing the total radioactivity prior to release to the environment.

### MEMBER(S) OF THE PUBLIC

1.30 MEMBER(S) OF THE PUBLIC shall include all persons who are not occupationally associated with the plant. This category does not include employees of the utility, its contractors or vendors. Also excluded from this category are persons who enter the site to service equipment or to make deliveries.

### OFFSITE DOSE CALCULATION MANUAL (ODCM)

1.31 The OFFSITE DOSE CALCULATION MANUAL shall contain the current methodology and parameters used in the calculation of offsite doses due to radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring alarm/trip setpoints, and in the conduct of the environmental radiological monitoring program.

## DEFINITIONS

### PROCESS CONTROL PROGRAM (PCP)

1.32 The PROCESS CONTROL PROGRAM shall contain the current formula, sampling, analyses, tests, and determinations to be made to ensure that the processing and packaging of solid radioactive wastes based on demonstrated processing of actual or simulated wet solid wastes will be accomplished in such a way as to assure compliance with 10 CFR Part 20, 10 CFR Part 71 and Federal and State and local regulations governing the disposal of the radioactive waste.

### PURGE - PURGING

1.33 PURGE or PURGING is the controlled process of discharging air or gas from a confinement to maintain temperature, humidity, concentration or other operating condition, in such a manner that replacement air or gas is required to purify the confinement.

### SITE BOUNDARY

1.34 The SITE BOUNDARY shall be that line beyond which the land is neither owned, nor leased, nor otherwise controlled by the licensee.

### SOLIDIFICATION

1.35 SOLIDIFICATION shall be the conversion of wet wastes into a form that meets shipping and burial ground requirements.

### SOURCE CHECK

1.36 A SOURCE CHECK shall be the qualitative assessment of channel response when the channel sensor is exposed to a source of increased radioactivity.

### UNRESTRICTED AREA

1.37 An UNRESTRICTED AREA shall be any area at or beyond the SITE BOUNDARY access to which is not controlled by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials, or any area within the SITE BOUNDARY used for residential quarters or for industrial, commercial, institutional, and/or recreational purposes.

### VENTILATION EXHAUST TREATMENT SYSTEM

1.38 A VENTILATION EXHAUST TREATMENT SYSTEM is any system designed and installed to reduce gaseous radioiodine or radioactive material in particulate form in effluents by passing ventilation or vent exhaust gases through charcoal adsorbers and/or HEPA filters for the purpose of removing iodines or particulates from the gaseous exhaust stream prior to the release to the environment. Such a system is not considered to have any effect on noble gas effluents. Engineered Safety Feature (ESF) atmospheric cleanup systems are not considered to be VENTILATION EXHAUST TREATMENT SYSTEM components.

## DEFINITIONS

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### VENTING

1.39 VENTING is the controlled process of discharging air or gas from a confinement to maintain temperature, pressure, humidity, concentration or other operating condition, in such a manner that replacement air or gas is not provided or required during VENTING. Vent, used in system names, does not imply a VENTING process.

TABLE 1.1  
OPERATIONAL MODES

<u>MODE</u>	<u>REACTIVITY CONDITION, <math>K_{eff}</math></u>	<u>%RATED THERMAL POWER*</u>	<u>AVERAGE COOLANT TEMPERATURE</u>
1. POWER OPERATION	$\geq 0.99$	$> 5\%$	$\geq 300^{\circ}\text{F}$
2. STARTUP	$\geq 0.99$	$\leq 5\%$	$\geq 300^{\circ}\text{F}$
3. HOT STANDBY	$< 0.99$	0	$\geq 300^{\circ}\text{F}$
4. HOT SHUTDOWN	$< 0.99$	0	$300^{\circ}\text{F} > T_{avg}$ $> 200^{\circ}\text{F}$
5. COLD SHUTDOWN	$< 0.99$	0	$\leq 200^{\circ}\text{F}$
6. REFUELING**	$\leq 0.95$	0	$\leq 140^{\circ}\text{F}$

---

\* Excluding decay heat.

\*\* Reactor vessel head unbolted or removed and fuel in the vessel.

TABLE 1.2  
FREQUENCY NOTATION

<u>NOTATION</u>	<u>FREQUENCY</u>
S	At least once per 12 hours.
D	At least once per 24 hours.
W	At least once per 7 days.
M	At least once per 31 days.
Q	At least once per 92 days.
SA	At least once per 6 months.
R	At least once per 18 months.
S/U	Prior to each reactor startup.
P	Completed prior to each release.
N.A.	Not applicable.

### 3/4.12 RADIOLOGICAL ENVIRONMENTAL MONITORING

#### MONITORING PROGRAM

#### LIMITING CONDITION FOR OPERATION

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3.12.1 The radiological environmental monitoring program shall be conducted as specified in Table 3.12-1.

APPLICABILITY: At all times.

ACTION:

- a. With the radiological environmental monitoring program not being conducted as specified in Table 3.12-1, prepare and submit to the Commission in the Annual Radiological Environmental Operating Report a description of the reasons for not conducting the program as required and the plans for preventing a recurrence.
- b. With the level of radioactivity as the result of plant effluents in an environmental sample at a specified location exceeding the reporting levels of Table 3.12-2, prepare and submit to the Commission within 30 days after receiving the sample analysis, pursuant to Specification 6.9.2, a Special Report that identifies the cause(s) for exceeding the limit(s) and defines the corrective actions to be taken to reduce radioactive effluents. When more than one of the radionuclides in Table 3.12-2 are detected in the sample, this report shall be submitted if:

$$\frac{\text{concentration}(1)}{\text{reporting level}(1)} + \frac{\text{concentration}(2)}{\text{reporting level}(2)} + \dots \geq 1.0$$

This report is not required if the measured level of radioactivity was not the result of plant effluents; however, in such an event, the condition shall be reported and described in the Annual Radiological Environmental Operating Report.

- c. With fresh leafy vegetable samples unavailable from one or more of the sample locations required by Table 3.12-1, identify locations for obtaining replacement samples and add them to the radiological environmental monitoring program within 30 days. The specific locations from which samples were unavailable may then be deleted from the monitoring program. Identify the cause of the unavailability of samples and identify the new location(s) for obtaining the replacement samples in the next Annual Radiological Environmental Operating Report.

3/4.12 RADIOLOGICAL ENVIRONMENTAL MONITORING

MONITORING PROGRAM

LIMITING CONDITION FOR OPERATION

---

- d. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

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4.12.1 The radiological environmental monitoring samples shall be collected pursuant to Table 3.12-1 from the specific locations given in the table and figure(s) in the ODCM, and shall be analyzed pursuant to the requirements of Table 3.12-1 and the detection capabilities required by Table 4.12-1.

TABLE 3.12-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

<u>Exposure Pathway and/or Sample</u>	<u>Number of Representative Samples and Sample Locations<sup>a</sup></u>	<u>Sampling and Collection Frequency</u>	<u>Type and Frequency of Analysis</u>
1. DIRECT RADIATION <sup>b</sup>	<p>23 routine monitoring stations (DR1-DR23) either with two or more dosimeters or with one instrument for measuring and recording dose rate continuously, placed as follows:</p> <p>an inner ring of stations, one in each meteorological sector in the general area of the SITE BOUNDARY (DR1-DR9);</p> <p>an outer ring of stations, one in each meteorological sector in the 6- to 8-km range from the site (DR10-DR18);</p> <p>the remaining stations (DR19-DR23) to be placed in special interest areas such as population centers, nearby residences, schools, and in 1 area to serve as a control station.</p>	At least Quarterly	Gamma dose at least quarterly.
2. AIRBORNE	Samples from 5 locations (A1-A5):	Continuous sampler operation with sample collection weekly, or more frequently if required by dust loading.	Radioiodine Cannister I-131 analysis weekly.
Radioiodine and Particulates	3 samples (A1-A3) from close to the 3 SITE BOUNDARY locations, in different sectors of the highest		Particulate Sampler: Gross beta radioactivity analysis following



TABLE 3.12-1 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

<u>Exposure Pathway and/or Sample</u>	<u>Number of Representative Samples and Sample Locations<sup>a</sup></u>	<u>Sampling and Collection Frequency</u>	<u>Type and Frequency of Analysis</u>
	calculated annual average ground-level D/Q.		filter change; <sup>c</sup> Gamma isotopic anal- ysis <sup>d</sup> of composite (by location) quarterly.
	1 sample (A4) from the vicinity of a community having the high- est calculated annual average ground-level D/Q.		
	1 sample (A5) from a control location, as for example 15-30 km distant and in the least prevalent wind direction.		
3. WATERBORNE			
a. Surface	1 sample at intake area (Wa1) 1 sample at discharge area (Wa2)	Composite sample over 1-month period <sup>e</sup>	Gamma isotopic anal- ysis <sup>d</sup> monthly. Compos- ite for tritium anal- ysis quarterly.
b. Sediment from shoreline	1 sample from downstream area with existing or potential recreational value (Wb1).	Semiannually	Gamma isotopic anal- ysis <sup>d</sup> semiannually.
4. INGESTION			
a. Fish and Invertebrates	3 samples of commercially and/or recreationally important species (2 fish species and 1 inverte- brate species) in vicinity of plant discharge area (Ia1-Ia3).	Sample in season, or semiannually if they are not seasonal.	Gamma isotopic analysis <sup>d</sup> on edible portions.
	3 samples of same species in areas not influenced by plant discharge (Ia4-Ia6).		

TABLE 3.12-1 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

<u>Exposure Pathway and/or Sample</u>	<u>Number of Representative Samples and Sample Locations<sup>a</sup></u>	<u>Sampling and Collection Frequency</u>	<u>Type and Frequency of Analysis</u>
b. Food Products	Samples of 3 different kinds of broad leaf vegetation grown near the site boundary at 2 different locations of highest predicted annual average groundlevel D/Q (Ib1-Ib6).	Monthly during growing season.	Gamma isotopic <sup>d</sup> and I-131 analysis.
	1 sample of each of the similar broad leaf vegetation grown 15-30 km distant in the least prevalent wind direction (Ib7-Ib9).	Monthly during growing season.	Gamma isotopic <sup>d</sup> and I-131 analysis.

TABLE 3.12-1 (Continued)

TABLE NOTATION

- a The code in parentheses, e.g., DR1, A1, defines generic sample locations in this specification that can be used to identify the specific locations in the map(s) and table in the ODCM. Specific parameters of distance and direction sector from the central point between the two containment buildings and additional description where pertinent is provided for each sample location in Table 3.12-1, and in a table and figure(s) in the ODCM. Refer to NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants, October 1978", and to Radiological Assessment Branch Technical Position, Revision 1, November 1979. Deviations are permitted from the required sampling schedule if specimens are unobtainable due to circumstances such as hazardous conditions, seasonal unavailability, and malfunction of automatic sampling equipment. If specimens are unobtainable due to sampling equipment malfunction, effort shall be made to complete corrective action prior to the end of the next sampling period. All deviations from the sampling schedule shall be documented in the Annual Radiological Environmental Operating Report. It is recognized that, at times, it may not be possible or practicable to continue to obtain samples of the media of choice at the most desired location or time. In these instances, suitable alternative media and locations may be chosen for the particular pathway in question and appropriate substitutions made within 30 days in the radiological environmental monitoring program. Identify the cause of the unavailability of samples for that pathway and identify the new location(s) for obtaining samples in the next Annual Radiological Environmental Operating Report and also include in the report a revised figure(s) and table for the ODCM reflecting the new location(s).
- b One or more instruments, such as a pressurized ion chamber, for measuring and recording dose rate continuously may be used in place of, or in addition to, integrating dosimeters. For the purposes of this table, a thermoluminescent dosimeter (TLD) is considered to be one phosphor; two or more phosphors in a packet are considered as two or more dosimeters. Film badges shall not be used as dosimeters for measuring direct radiation. The frequency of analysis or readout for TLD systems will depend upon the characteristics of the specific system used and should be selected to obtain optimum dose information with minimal fading. Due to the geographical limitations, 9 sectors are monitored around the Calvert Cliffs Nuclear Power Plant.
- c Airborne particulate sample filters shall be analyzed for gross beta radioactivity 24 hours or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air particulate samples is greater than ten times the yearly mean of control samples, gamma isotopic analysis shall be performed on the individual samples.

TABLE 3.12-1 (Continued)

TABLE NOTATION (Continued)

- d Gamma isotopic analysis means the identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents from the facility.
- e A composite sample is one in which the quantity (aliquot) of liquid sampled is proportional to the quantity of flowing liquid and in which the method of sampling employed results in a specimen that is representative of the liquid flow. In this program, composite sample aliquots shall be collected at time intervals that are very short (e.g., hourly) relative to the compositing period (e.g., monthly) in order to assure obtaining a representative sample.

TABLE 3.12-2

REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

REPORTING LEVELS

Analysis	Water (pCi/l)	Airborne Particulate or Gases (pCi/m <sup>3</sup> )	Fish & Invertebrates (pCi/kg, wet)	Milk (pCi/l)	Food Products (pCi/kg, wet)
H-3	20,000*				
Mn-54	1,000		30,000		
Fe-59	400		10,000		
Co-58	1,000		30,000		
Co-60	300		10,000		
Zn-65	300		20,000		
Zr-Nb-95	400				
I-131	2	0.9		3	100
Cs-134	30	10	1,000	60	1,000
Cs-137	50	20	2,000	70	2,000
Ba-La-140	200			300	

\*For drinking water samples. This is a 40 CFR Part 141 value. If no drinking water pathway exists, a value of 30,000 pCi/l may be used.

CALVERT CLIFFS - UNIT 2

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TABLE 4.12-1

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS<sup>a,b</sup>LOWER LIMIT OF DETECTION (LLD)<sup>c</sup>

Analysis	Water (pCi/l)	Airborne Particulate or Gases (pCi/m <sup>3</sup> )	Fish & Invertebrates (pCi/kg, wet)	Milk (pCi/l)	Food Products (pCi/kg, wet)	Sediment (pCi/kg, dry)
Gross Beta	4	0.01				
H-3	2000*					
Mn-54	15		130			
Fe-59	30		260			
Co-58,60	15		130			
Zn-65	30		260			
Zr-Nb-95	15					
I-131	1 <sup>d</sup>	0.07		1	60	
Cs-134	15	0.05	130	15	60	150
Cs-137	18	0.06	150	18	80	180
Ba-La-140	15			15		

\*If no drinking water pathway exists, a value of 3000 pCi/l may be used.

TABLE 4.12-1 (Continued)

TABLE NOTATION

- a This list does not mean that only these nuclides are to be considered. Other peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Annual Radiological Environmental Operating Report.
- b Required detection capabilities for thermoluminescent dosimeters used for environmental measurements shall be in accordance with the recommendations of Regulatory Guide 4.13.
- c The LLD is defined, for purposes of these specifications, as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66s_b}{E \cdot V \cdot 2.22 \cdot Y \cdot \exp(-\lambda \Delta t)}$$

Where:

LLD is the "A priori" lower limit of detection as defined above, as picocuries per unit mass or volume,

$s_b$  is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate, as counts per minute,

E is the counting efficiency, as counts per disintegration,

V is the sample size in units of mass or volume,

2.22 is the number of disintegrations per minute per picocurie,

Y is the fractional radiochemical yield, when applicable,

$\lambda$  is the radioactive decay constant for the particular radionuclide, and

$\Delta t$  for environmental samples is the elapsed time between sample collection, or end of the sample collection period, and time of counting

Typical values of E, V, Y and  $\Delta t$  should be used in the calculation.

TABLE 4.12-1 (Continued)

TABLE NOTATION

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement. Analyses shall be performed in such a manner that the stated LLDs will be achieved under routine conditions. Occasionally background fluctuations, unavoidable small sample sizes, the presence of interfering nuclides, or other uncontrollable circumstances may render these LLDs unachievable. In such cases, the contributing factors shall be identified and described in the Annual Radiological Environmental Operating Report.

- d LLD for drinking water samples. If no drinking water pathway exists, the LLD of gamma isotopic analysis may be used.



### 3/4.12 RADIOLOGICAL ENVIRONMENTAL MONITORING

#### LAND USE CENSUS

#### LIMITING CONDITION FOR OPERATION

3.12.2 A land use census shall be conducted and shall identify within a distance of 8 km (5 miles) the location in each of the 9 meteorological sectors of the nearest milk animal, the nearest residence and the nearest garden\* of greater than 50 m<sup>2</sup> (500 ft<sup>2</sup>) producing broad leaf vegetation. (For elevated releases as defined in Regulatory Guide 1.111, Revision 1, July 1977, the land use census shall also identify within a distance of 5 km (3 miles) the locations in each of the 9 meteorological sectors of all milk animals and all gardens of greater than 50 m<sup>2</sup> producing broad leaf vegetation.)

APPLICABILITY: At all times.

#### ACTION:

- a. With a land use census identifying a location(s) that yields a calculated dose or dose commitment greater than the values currently being calculated, identify the new location(s) in the next Annual Radiological Environmental Operating Report.
- b. With a land use census identifying a location(s) that yields a calculated dose or dose commitment (via the same exposure pathway) 20 percent greater than at a location from which samples are currently being obtained in accordance with Specification 3.12.1, add the new location(s) to the radiological environmental monitoring program within 30 days. The sampling location(s), excluding the control station location, having the lowest calculated dose or dose commitment(s), via the same exposure pathway, may be deleted from this monitoring program after October 31 of the year in which this land use census was conducted. Identify the new location(s) in the next Annual Radiological Environmental Operating Report and also include in the report a revised figure(s) and table for the ODCM reflecting the new location(s).
- c. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

#### SURVEILLANCE REQUIREMENTS

4.12.2 The land census shall be conducted during the growing season at least once per 12 months using that information that will provide the best results, such as by a door-to-door survey, aerial survey, or by consulting local agricultural authorities. The results of the land use census shall be included in the Annual Radiological Environmental Operating Report.

\*Broad leaf vegetation sampling of at least three different kinds of vegetation may be performed at the site boundary in each of two different direction sectors with the highest predicted D/Qs in lieu of the garden census. Specifications for broad leaf vegetation sampling in Table 3.12.1.4b shall be followed, including analysis of control samples.

### 3/4.12 RADIOLOGICAL ENVIRONMENTAL MONITORING

#### INTERLABORATORY COMPARISON PROGRAM

#### LIMITING CONDITION FOR OPERATION

---

3.12.3 Analyses shall be performed on all radioactive materials, supplied as part of an Interlaboratory Comparison Program that has been approved by the Commission, that correspond to samples required by Table 3.12-1.

APPLICABILITY: At all times.

ACTION:

- a. With analyses not being performed as required above, report the corrective actions taken to prevent a recurrence to the Commission in the Annual Radiological Environmental Operating Report.
- b. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

#### SURVEILLANCE REQUIREMENTS

---

4.12.3 The Interlaboratory Comparison Program shall be described in the ODCM. A summary of the results obtained as part of the above required Interlaboratory Comparison Program shall be included in the Annual Radiological Environmental Operating Report.

### 3/4.12 RADIOLOGICAL ENVIRONMENTAL MONITORING

#### BASES

#### 3/4.12.1 MONITORING PROGRAM

The radiological environmental monitoring program required by this specification provides representative measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides that lead to the highest potential radiation exposures to MEMBERS OF THE PUBLIC resulting from the plant operation. This monitoring program implements Section IV.B.2 of Appendix I to 10 CFR Part 50 and thereby supplements the radiological effluent monitoring program by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and the modeling of the environmental exposure pathways. Guidance for this monitoring program is provided by the Radiological Assessment Branch Technical Position on Environmental Monitoring. Program changes may be initiated based on operational experience.

The required detection capabilities for environmental sample analyses are tabulated in terms of the lower limits of detection (LLDs). The LLDs required by Table 4.12-1 are considered optimum for routine environmental measurements in industrial laboratories. It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement.

Detailed discussion of the LLD and other detection limits can be found in HASL Procedures Manual, HASL-300 (revised annually), Currie, L. A., "Limits for Qualitative Detection and Quantitative Determination - Application to Radiochemistry," anal. Chem. 40, 586-93 (1968), and Hartwell, J. K., "Detection Limits for Radioanalytical Counting Techniques," Atlantic Richfield Hanford Company Report ARH-SA-215 (June 1975).

#### 3/4.12.2 LAND USE CENSUS

This specification is provided to ensure that changes in the use of areas at and beyond the SITE BOUNDARY are identified and that modifications to the radiological environmental monitoring program are made if required by the results of this census. The best information from the door-to-door survey, from aerial survey or from consulting with local agricultural authorities shall be used. This census satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50. Restricting the census to gardens of greater than 50 m<sup>2</sup> provides assurance that significant exposure pathways via leafy vegetables will be identified and monitored since a garden of this size is the minimum required to produce the quantity (26 kg/year) of leafy vegetables assumed in Regulatory Guide 1.109 for consumption by a child. To determine this minimum garden size, the following assumptions were made: 1) 20% of the garden was used for growing broad leaf vegetation (i.e., similar to lettuce and cabbage), and 2) a vegetation yield of 2 kg/m<sup>2</sup>.

3/4.12 RADIOLOGICAL ENVIRONMENTAL MONITORING

BASES

---

3/4.12.3 INTERLABORATORY COMPARISON PROGRAM

The requirement for participation in an approved Interlaboratory Comparison Program is provided to ensure that independent checks on the precision and accuracy of the measurements of radioactive material in environmental sample matrices are performed as part of the quality assurance program for environmental monitoring in order to demonstrate that the results are valid for the purposes of Section IV.B.2 of Appendix I to 10 CFR Part 50.

## REFUELING OPERATIONS

### BASES

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#### 3/4.9.10 and 3/4.9.11 WATER LEVEL-REACTOR VESSEL AND SPENT FUEL POOL WATER LEVEL

The restrictions on minimum water level ensure that sufficient water depth is available to remove 99% of the assumed 10% iodine gas activity released from the rupture of an irradiated fuel assembly. The minimum water depth is consistent with the assumptions of the accident analysis.

#### 3/4.9.12 SPENT FUEL POOL VENTILATION SYSTEM

The limitations on the spent fuel pool ventilation system ensure that all radioactive material released from an irradiated fuel assembly will be filtered through the HEPA filters and charcoal adsorber prior to discharge to the atmosphere. The OPERABILITY of this system and the resulting iodine removal capacity are consistent with the assumptions of the accident analyses.

#### 3/4.9.13 SPENT FUEL CASK HANDLING CRANE

The restriction on movement of the spent fuel shipping cask within one cask length of any fuel assembly ensures that in the event this load is dropped (1) the stored spent fuel assemblies will not be damaged, and (2) any possible distortion of fuel in the storage racks will not result in a critical array.

#### 3/4.9.14 CONTAINMENT VENT ISOLATION VALVES

The OPERABILITY and closure restrictions on the containment vent isolation valves are sufficient to restrict radioactive material release from a fuel element rupture based upon the lack of containment pressurization potential while in the REFUELING MODE.

## 5.0 DESIGN FEATURES

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### 5.1 SITE

#### MAP DEFINING THE SITE BOUNDARY AND EFFLUENT RELEASE POINTS

5.1.1 A map of the Calvert Cliffs Nuclear Power Plant site identifying the major plant structures as well as defining the radioactive effluent release points and the SITE BOUNDARY is shown in Figure 5.1-1.

#### LOW POPULATION ZONE

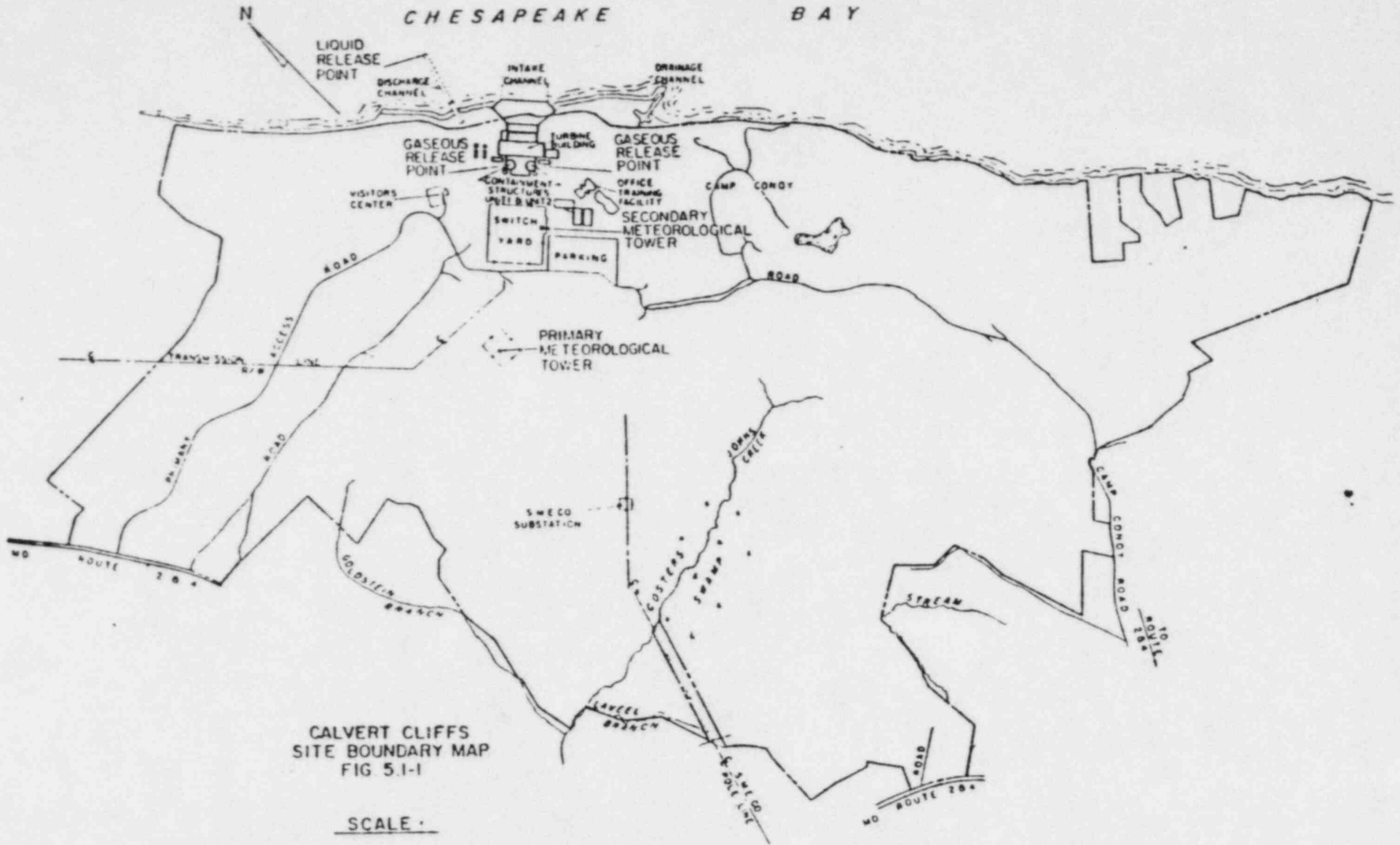
5.1.2 The low population zone shall be as shown in Figure 5.1-2.

### 5.2 CONTAINMENT

#### CONFIGURATION

5.2.1 The reactor containment building is a steel lined, reinforced concrete building of cylindrical shape, with a dome roof and having the following design features:

- a. Nominal inside diameter = 130 feet.
- b. Nominal inside height =  $181 \frac{2}{3}$  feet.
- c. Minimum thickness of concrete walls =  $3 \frac{3}{4}$  feet.
- d. Minimum thickness of concrete roof =  $3 \frac{1}{4}$  feet.
- e. Minimum thickness of concrete floor pad = 10 feet.
- f. Nominal thickness of steel liner =  $\frac{1}{4}$  inches.
- g. Net free volume =  $2 \times 10^6$  cubic feet.



CALVERT CLIFFS SITE BOUNDARY MAP FIG 5.1-1

SCALE



CALVERT CLIFFS NUCLEAR POWER PLANT

UNIT NOS. 1 AND 2

APPENDIX B

PART I

ENVIRONMENTAL TECHNICAL SPECIFICATIONS

FACILITY OPERATING LICENSE NOS. DPR-53 AND DPR-69

NOTE

Section 3.0, Environmental Surveillance and Monitoring, has been deleted. Any other portion of the Appendix B Part I Environmental Technical Specifications dealing with Environmental Monitoring is hereby superseded by Appendix A Technical Specification Section 3/4.12.

When the Radiological Effluent Technical Specifications (RETS) are fully implemented, Appendix B, Part I, will be deleted in its entirety.

ISSUED BY THE U. S. NUCLEAR REGULATORY COMMISSION



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3.0 ENVIRONMENTAL SURVEILLANCE AND MONITORING

DELETED

3.2 RADIOLOGICAL ENVIRONMENTAL MONITORING

DELETED